13.NA1/3:14/13

National Advisory Committee for Aeronautics

Research Abstracts

NO. 13 DECEMBER 17, 1951

CURRENT NACA REPORTS

NACA Rept. 1013

EFFECT OF WING FLEXIBILITY AND VARIABLE AIR LIFT UPON WING BENDING MOMENTS DURING LANDING IMPACT OF A SMALL SEAPLANE. Kenneth F. Merten and Edgar B. Beck. 1951. 7p. diagrs., 2 tabs. (NACA Rept. 1013. Formerly TN 2063)

Comparisons of theoretical and experimental wing bending moments during landing impacts of a small seaplane are presented in the form of time-history curves. The effects of air-load change during impact on the bending moments in the wing are included in the theoretical calculations. Good agreement between measured and computed wing bending moments was obtained when the three components of the wing moment (static water-load moment, dynamic water-load moment, and air-load moment) were included in the calculations.

NACA TN 2452

FLEXURAL FATIGUE STRENGTHS OF RIVETED BOX BEAMS - ALCLAD 14S-T6, ALCLAD 75S-T6, AND VARIOUS TEMPERS OF ALCLAD 24S. I. D. Eaton and Marshall Holt. Aluminum Company of America. November 1951. 25p. diagrs., photos., 3 tabs. (NACA TN 2452)

Results are given of tests made to determine and compare the flexural fatigue strengths of built-up riveted box beams made from 14S-T6, 75S-T6, and various tempers of 24S alclad aluminum-alloy sheet.

NACA TN 2482

STABILITY AND CONTROL CHARACTERISTICS OF A COMPLETE AIRPLANE MODEL HAVING A WING WITH QUARTER-CHORD LINE SWEPT BACK 40°, ASPECT RATIO 2.50, AND TAPER RATIO 0.42. Marvin Schuldenfrei, Paul Comisarow and Kenneth W. Goodson. December 1951. 86p. photos., diagrs. (NACA TN 2482. Formerly RM L7B25)

An investigation has been made of a complete airplane model having a wing with the quarter-chord line swept back 40°, aspect ratio 2.50, and taper ratio 0.42 to determine its low-speed stability and control characteristics. The longitudinal stability investigation included stabilizer and tail-off tests with different wing dihedral angles ($\Gamma = 0^\circ$ and $\Gamma = -10^\circ$) over an angle-of-attack range for the cruising and landing configurations and tests with a high horizontal-tail location ($\Gamma = -10^\circ$) for the cruising configuration. Tests were made of the wing alone and to determine the effect of wing end plates in pitch. Lateral stability characteristics were determined for the airplane with different geometric wing dihedrals, with end plates, and with several dorsal modifications. Tests were made with ailerons and spoilers to determine control characteristics.

NACA TN 2518

CRITERIONS FOR CONDENSATION-FREE FLOW IN SUPERSONIC TUNNELS. Warren C. Burgess, Jr. and Ferris L. Seashore. December 1951. 39p. diagrs., photos., tab. (NACA TN 2518. Formerly RM E9E02)

The results of an investigation of water-vapor condensation shocks in the air passing through supersonic tunnels are presented. Criterions for condensation free flow are established by correlating experimental observations with the Volmer theory of nuclei formation. Experimental observations were made at Mach numbers up to 2.01. The criterions are presented in a form independent of tunnel-inlet stagnation pressure and are extended theoretically to a Mach number of 4.0. Preliminary evidence of the effect of tunnel size on the criterions is presented.

NACA TN 2527

A VELOCITY-CORRECTION FORMULA FOR THE CALCULATION OF TRANSONIC MACH NUMBER DISTRIBUTIONS OVER DIAMOND-SHAPED AIRFOILS. H. Reese Ivey and Keith C. Harder. November 1951. 28p. diagrs. (NACA TN 2527)

A velocity-correction formula is proposed for the purpose of calculating, from the known Mach number distribution for a diamond-shaped airfoil, at a stream Mach number of 1.0, Mach number distributions on the same airfoil at speeds from a Mach number of about 0.8 to shock-attachment Mach number. An expression for the rate of change of local Mach number with stream Mach number is derived and an explicit equation for the drag coefficient as a function of stream Mach number and thickness ratio is given.

NACA TN 2536

CRITICAL COMBINATIONS OF BENDING, SHEAR, AND TRANSVERSE COMPRESSIVE STRESSES FOR BUCKLING OF INFINITELY LONG FLAT PLATES. Aldie E. Johnson, Jr. and Kenneth P. Buchert. December 1951. 40p. diagrs., 3 tabs. (NACA TN 2536)

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Three-dimensional interaction surfaces are presented for the computation of elastic buckling stresses for an infinitely long flat plate subjected to combinations of bending, shear, and transverse compression in its plane - a loading approximating that occurring in a shear web. Surfaces are presented for two sets of edge conditions: both edges simply supported, and lower edge simply supported, upper edge clamped. Present results are in good agreement with data for one-load and two-load limiting cases previously published.

NACA TN 2537

HEAT CAPACITY LAG IN GASES. Richard Walker, Iowa State College. November 1951. 40p. diagrs., tab. (NACA TN 2537)

A review is presented of the literature on the sonic studies of the problem of the excitation of molecular vibrations by collision and the theory on which the interpretation of almost all the sonic work has been based is discussed. The principal experimental programs are described and most of the available results are included in a table.

NACA TN 2542

STUDIES OF VON KÁRMÁN'S SIMILARITY THEORY AND ITS EXTENSION TO COMPRESSIBLE FLOWS. A SIMILARITY THEORY FOR TURBULENT BOUNDARY LAYER OVER A FLAT PLATE IN COMPRESSIBLE FLOW. C. C. Lin and S. F. Shen, Massachusetts Institute of Technology. November 1951. 37p. (NACA TN 2542)

As an application of the concepts in NACA TN 2541, the problem of turbulent boundary layer over a flat plate in compressible flow is treated. The dissipation term in the energy equation, usually neglected, is first studied and found to be of importance. In the differential equations governing the fluctuations, the lower-frequency components of all quantities are regarded to participate in an equilibrium in accordance with similarity. After proper linearization, a set of differential equations containing only the lower order frequency fluctuations is obtained. In parallel with Von Kármán's theory in incompressible flow, similarity scales for all the flow variables are derived. Two possible length scales are found and the significance of this possibility is discussed.

NACA TN 2543

STUDIES OF VON KÁRMÁN'S SIMILARITY THEORY AND ITS EXTENSION TO COMPRESSIBLE FLOWS. INVESTIGATION OF TURBULENT BOUNDARY LAYER OVER A FLAT PLATE IN COMPRESSIBLE FLOW BY THE SIMILARITY THEORY. S. F. Shen, Massachusetts Institute of Technology. November 1951. 43p. (NACA TN 2543)

The turbulent-boundary-layer flow over a flat plate in compressible flow is considered on the basis of the scheme established in NACA TN 2542. It is shown how the influence of the Mach number (e.g., on the velocity and temperature distribution) can be predicted from the theory after the constant coefficients in the theory are determined by one set of experimental measurements.

NACA TN 2547

AN INVESTIGATION BY THE HODOGRAPH METHOD OF FLOW THROUGH A SYMMETRICAL NOZZLE WITH LOCALLY SUPERSONIC REGIONS. F. Edward Ehlers and Hirsh G. Cohen, Brown University. November 1951. 61p. diagrs., 2 tabs. (NACA TN 2547)

To study the flow of a compressible fluid through a channel having locally supersonic regions, the Tricomi equation is used in the hodograph variables as an approximation in the sonic region to the equation of flow of an irrotational, inviscid gas. A one-parameter family of solutions of the Tricomi equation is used which provides symmetrical accelerated-decelerated flows. Variation of this parameter alters the Mach number at the center of the throat, the velocity distribution and gradient along the center streamline, as well as the shape of the channel, that is the curvature of the bounding streamline. Other solutions to the Tricomi equation are discussed which may be used to formulate channel flows.

NACA TN 2550

DETERMINATION OF SHAPES OF BOATTAIL BODIES OF REVOLUTION FOR MINIMUM WAVE DRAG. Mac C. Adams. November 1951. 20p. diagrs. (NACA TN 2550)

By use of an approximate equation for the wave drag of slender bodies of revolution in a supersonic flow field, the optimum shapes of certain boattail bodies are determined for minimum wave drag. The properties of three specific families of bodies are determined, the first family consisting of bodies having a given length and base area and a contour passing through a prescribed point between the nose and base, the second family having fixed length, base area, and maximum area, and the third family having given length, volume, and base area.

NACA TN 2551

EFFECT OF VARIOUS PARAMETERS INCLUDING MACH NUMBER ON THE SINGLE-DEGREE-OF-FREEDOM FLUTTER OF A CONTROL SURFACE IN POTENTIAL FLOW. Harry L. Runyan. December 1951. 33p. diagrs. (NACA TN 2551)

Calculations demonstrating the existence of single-degree-of-freedom flutter of a control surface are presented. The effect of various parameters such as Mach number, aerodynamic balance, structural damping, and inertia ratio are shown. Even though the calculations are based on potential-flow theory, the results should provide a logical basis or framework with which to examine oscillations of a control surface believed due to separated flow phenomena.

NACA TN 2552

CONSIDERATIONS ON THE EFFECT OF WIND-TUNNEL WALLS ON OSCILLATING AIR FORCES FOR TWO-DIMENSIONAL SUBSONIC COMPRESSIBLE FLOW. Harry L. Runyan and Charles E. Watkins. December 1951. 18p. diagrs. (NACA TN 2552)

This paper treats the effect of wind-tunnel walls on the oscillating two-dimensional air forces in a compressible medium. The walls are simulated by the usual method of placing images at appropriate distances above and below the wing. An important result shown is that, for certain conditions of wing frequency, tunnel height, and Mach number, the tunnel and wing may form a resonant system so that the forces on the wing are greatly changed from the condition of no tunnel walls.

NACA TN 2554

THEORETICAL AERODYNAMIC CHARACTERISTICS OF A FAMILY OF SLENDER WING-TAIL-BODY COMBINATIONS. Harvard Lomax and Paul F. Byrd. November 1951. 75p. diagrs., 2 tabs. (NACA TN 2554)

The aerodynamic characteristics of an airplane configuration composed of a swept-back, nearly constant chord wing and a triangular tail mounted on a cylindrical body are presented. The analysis is based on the assumption that the free-stream Mach number is near unity or that the configuration is slender. The calculations for the tail are made on the assumption that the vortex system trailing back from the wing is either a sheet lying entirely in the plane of the flat tail surface or has completely "rolled up" into two point vortices that lie either in, above, or below the plane of the tail surface.

NACA TN 2557

INFRARED SPECTRA OF 59 DICYCLIC HYDROCARBONS. K. T. Serijan, I. A. Goodman and W. J. Yankauskas. November 1951. 37p. diagrs., 4 tabs. (NACA TN 2557)

The infrared spectra are presented for 59 dicyclic hydrocarbons consisting of some diphenylalkanes, dicyclohexylalkanes, alkylbiphenyls, and alkylbicyclohexyls ranging from C_{12} to C_{18}. The physical properties of these compounds, which were available in a high state of purity, are tabulated for reference purposes.

NACA TN 2558

SOME EFFECTS OF VARIATIONS IN SEVERAL PARAMETERS INCLUDING FLUID DENSITY ON THE FLUTTER SPEED OF LIGHT UNIFORM CANTILEVER WINGS. Donald S. Woolston and George E. Castile. December 1951. 40p. diagrs., 10 tabs. (NACA TN 2558)

An experimental investigation has been made of some effects of variations in several parameters, including fluid density, on the flutter characteristics of light uniform cantilever wings. Special emphasis has been placed on low values of the relative-density parameter $1/\sqrt{\kappa}$, where κ is the ratio of fluid density to wing mass. The experimental investigation has been supplemented by an analytical investigation. In general, the theoretical results followed the trends indicated by experiment except at low values of the relative density parameter and, in this region, additional analytical investigation seems necessary.

NACA TN 2559

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF CONDENSATION OF AIR IN HYPERSONIC WIND TUNNELS. H. Guyford Stever and Kenneth C. Rathbun, Massachusetts Institute of Technology. November 1951. 79p. diagrs., photos. (NACA TN 2559)

Presents results of theoretical and experimental investigation of condensation of air in hypersonic wind tunnels. The experimental work was done in a tunnel with Mach number of approximately 7. Condensation was detected and measured by condensation-fog light-scattering, static-pressure measurements, and changes in wedge shock angle at degrees of supersaturation considerably lower than those predicted by existing condensation theory. Effects of varying supply pressures and temperatures were also measured. The nucleation theory of condensation was modified to take account of a postulated variation of surface tension with decrease in size of spontaneously formed drops which act as nuclei of condensation. The modified theory was applied to pure oxygen and nitrogen and its predictions were compared with those of the unmodified theory.

NACA TN 2560

AN EXPERIMENTAL INVESTIGATION OF TRANSONIC FLOW PAST TWO-DIMENSIONAL WEDGE AND CIRCULAR-ARC SECTIONS USING A MACH-ZEHNDER INTERFEROMETER. Arthur Earl Bryson, Jr., California Institute of Technology. November 1951. 97p. diagrs., photos. (NACA TN 2560)

Interferometer measurements are given of the flow fields near two-dimensional wedge and circular-arc sections at zero angle of attack. Pressure distributions and drag coefficients as functions of Mach number were obtained and the wedge data are compared with theory. It is shown that the local Mach number at any point on the surface of a finite three dimensional body or an unswept two-dimensional body, moving through an infinite fluid, has a stationary value at Mach number 1 and, in fact, remains nearly constant for a range of speeds below and above Mach number 1. On the basis of this concept and the experimental data, pressure distributions and drag coefficients for the wedge and circular-arc sections are presented throughout the entire transonic range of velocities.

NACA TN 2562

NUMERICAL DETERMINATION OF INDICIAL LIFT OF TWO-DIMENSIONAL AIRFOILS AT SUBSONIC MACH NUMBERS FROM OSCILLATORY LIFT COEFFICIENTS WITH CALCULATIONS FOR MACH NUMBER 0.7. Bernard Mazelsky. December 1951. 38p. diagrs., tab. (NACA TN 2562)

The indicial lift and moment on an airfoil experiencing a sudden acquisition of vertical velocity is calculated for Mach number 0.7 from the available flutter coefficients for an oscillating airfoil. An approximate calculation is also made for the indicial-lift function due to penetration of a sharp-edged gust.

NACA TN 2565

A THEORETICAL ANALYSIS OF THE EFFECT OF SEVERAL AUXILIARY DAMPING DEVICES ON THE LATERAL STABILITY AND CONTROLLABILITY OF A HIGH-SPEED AIRCRAFT. Ordway B. Gates, Jr. December 1951. 39p. diagrs., 6 tabs. (NACA TN 2565)

An investigation has been made to determine the effect of several auxiliary damping devices on the lateral stability and controllability of a present-day high-speed airplane. The results are presented in the form of aircraft motions subsequent to applied yawing or rolling moments, comparisons of the time to damp to half amplitude and the period of the lateral modes of motion, rudder motion required for zero sideslip subsequent to an aileron deflection, and combinations of rudder and aileron deflection necessary to perform steady turning maneuvers for each of the investigated damping devices.

NACA TN 2566

A STUDY OF ELASTIC AND PLASTIC STRESS CONCENTRATION FACTORS DUE TO NOTCHES AND FILLETS IN FLAT PLATES. Herbert F. Hardrath and Lachlan Ohman. December 1951. 23p. diagrs. (NACA TN 2566)

Six large 24S-T3 aluminum-alloy-sheet specimens containing various notches or fillets were tested in tension to determine their stress concentration factors in the elastic and plastic ranges. The elastic stress concentration factors were found to be slightly higher than those predicted by other methods. A generalization of a relation presented by Stowell gave good agreement with the plastic stress concentration factors as they decreased with increasing plastic strain.

NACA TN 2569

A SUMMARY OF METEOROLOGICAL CONDITIONS ASSOCIATED WITH AIRCRAFT ICING AND A PROPOSED METHOD OF SELECTING DESIGN CRITERIONS FOR ICE-PROTECTION EQUIPMENT. Paul T. Hacker and Robert G. Dorsch. November 1951. 35p. diagrs. (NACA TN 2569)

Data on the meteorological parameters pertinent to the aircraft icing problem are so summarized as to give the frequency of occurrence of observed icing situations according to two of the parameters. The summarized data indicate that statistical relations exist between some of the parameters. A method, based upon the collection efficiency of an airfoil and the frequency of occurrence of icing situations with various liquid-water contents and mean-effective droplet sizes, is proposed for the selection of design criterions for ice-protection equipment. The method provides a convenient means of calculating the percentage of icing encounters in which the water collection rate exceeds the design rate.

NACA TN 2578

A COMPARISON OF PREDICTED AND EXPERIMENTALLY DETERMINED LONGITUDINAL DYNAMIC RESPONSES OF A STABILIZED AIRPLANE. Louis H. Smaus, Marvin R. Gore and Merle G. Waugh. December 1951. 53p. diagrs., photos. (NACA TN 2578)

The dynamic stability in pitch of an aircraft with autopilot was predicted by combining ground measured autopilot transfer functions to obtain open-loop and closed-loop frequency responses and transient responses for the combination. These predicted responses for three airspeeds and for various amounts of displacement and rate-of-displacement feedback are compared with corresponding frequency and transient responses of the stabilized airplane as measured in flight.

NACA TN 2579

APPROXIMATE METHODS FOR CALCULATING THE FLOW ABOUT NONLIFTING BODIES OF REVOLUTION AT HIGH SUPERSONIC AIRSPEEDS. A. J. Eggers, Jr. and Raymond C. Savin. December 1951. 40p. diagrs. (NACA TN 2579)

Explicit expressions are developed which yield the Mach number and pressure distributions on the surfaces of pointed nonlifting bodies of revolution operating at high supersonic airspeeds and at values of the hypersonic similarity parameter (ratio of free-stream Mach number to slenderness ratio) greater than 1. Very simple explicit expressions are obtained for these distributions in the special case of slender bodies. In the case of cones, the analytic solutions accurately define the entire flow field over a wide range of free-stream Mach numbers and apex angles.

NACA TN 2580

AN ANALYSIS OF AN X-RAY ABSORPTION METHOD FOR MEASUREMENT OF HIGH GAS TEMPERATURES. Ruth N. Weltmann and Perry W. Kuhns. December 1951. 35p. diagrs., photos., 2 tabs. (NACA TN 2580)

An analysis is presented of an X-ray absorption method for determining high gas temperatures. The

indicated temperature represents the mean density of the gas. Correction factors for dissociation and air-gas mixture are calculated as a function of temperature for stoichiometric mixtures of hydrocarbons and air. Design suggestions for a practical instrument are given on the basis of a theoretical analysis, which is corroborated by a few experimental data.

NACA RM E51I05

COMPARISON OF HIGH-SPEED OPERATING CHARACTERISTICS OF SIZE 215 CYLINDRICAL-ROLLER BEARINGS AS DETERMINED IN TURBO-JET ENGINE AND IN LABORATORY TEST RIG. E. Fred Macks and Zolton N. Nemeth. November 1951. 33p. diagrs., photos., tab. (NACA RM E51I05)

Inner- and outer-race cooling-correlation curves were obtained for the turbojet-engine turbine-roller bearing with the same inner- and outer-race cooling-correlation parameters and exponents as those determined for the test-rig bearing. The inner- and outer-race turbine roller-bearing temperatures may be predicted from a single curve regardless of variations in speed, load, oil flow, oil inlet temperatures, oil inlet viscosity, oil-jet diameter, or any combination of these parameters.

NACA RM E51I10

ELEVATED TEMPERATURE PROPERTIES OF TITANIUM CARBIDE BASE CERAMALS CONTAINING NICKEL OR IRON: A. L. Cooper and L. E. Colteryahn. December 1951. 47p. photos., diagrs., 5 tabs. (NACA RM E51I10)

Elevated-temperature properties of titanium carbide base ceramals containing nickel or iron were determined in oxidation, modulus of rupture, tensile strength, and thermal-shock resistance. Metallographic structure was studied. These materials followed the general growth law and exhibited two stages in oxidation. The following tensile strengths were found at 2000° F; 13.3 weight percent nickel, 16,150 pounds per square inch; 11.8 weight percent iron, 12,500 pounds per square inch; unalloyed titanium carbide, 16,450 pounds per square inch. Nickel or iron additions to titanium carbide improved the thermal-shock resistance, nickel more. The path of fracture in tensile and thermal-shock specimens was found to progress approximately 50 percent intergranularly and 50 percent transgranularly.

NACA RM E51I18

FORCED-CONVECTION HEAT TRANSFER TO WATER AT HIGH PRESSURES AND TEMPERATURES IN THE NONBOILING REGION. S. J. Kaufman and R. W. Henderson. November 1951. 16p. diagrs., photos. (NACA RM E51I18)

Forced-convection heat-transfer data have been obtained for water flowing in an electrically heated tube of circular cross section at water pressures of 200 and 2000 pounds per square inch, and temperatures in the nonboiling region, for water velocities ranging between 5 and 35 feet per second. The results indicate that conventional correlations can be used to predict heat-transfer coefficients for water at pressures up to 2000 pounds per square inch and temperatures in the nonboiling region.

NACA RM E51J05

FUNDAMENTAL FLAME VELOCITIES OF PURE HYDROCARBONS. III - EXTENSION OF TUBE METHOD TO HIGH FLAME VELOCITIES - ACETYLENE-AIR MIXTURES. Oscar Levine and Melvin Gerstein. December 1951. 21p. diagrs. (NACA RM E51J05)

The tube method of measuring flame velocities has been extended to fundamental flame velocities of 141 centimeters per second. This extension was accomplished by reducing the flame-tube diameter from 25 to 12.5 millimeters. The reduction in flame-tube diameter decreased the Reynolds number of the unburned gas ahead of the flame from a turbulent to a laminar region. The gas-velocity correction in the 12.5-millimeter flame tube fits the empirical linear relation between gas velocity and spatial flame velocity previously obtained in the 25-millimeter flame tube. The ratio of the flame tube cross sectional area to the flame surface area was found to be the same constant in the 25- and the 12.5-millimeter flame tubes. A simplified equation for calculating the flame surface area from flame photographs is presented.

NACA RM E51J09

VARIATION OF THE PRESSURE LIMITS OF FLAME PROPAGATION WITH TUBE DIAMETER FOR PROPANE-AIR MIXTURES. Frank E. Belles and Dorothy M. Simon. December 1951. 17p. diagrs., tab. (NACA RM E51J09)

An investigation was made of the variation of the pressure limits of flame propagation with tube diameter for quiescent propane-air mixtures. Pressure limits were measured in glass tubes of six different inside diameters, with a precise apparatus. Critical diameters for flame propagation were calculated and the effect of pressure was determined. The critical diameters depended on the pressure to the -0.97 power for stoichiometric mixtures. The pressure dependence decreased with decreasing propane concentration. Critical diameters were related to quenching distance, flame speeds, and minimum ignition energy.

NACA TM 1316

RESISTANCE OF A PLATE IN PARALLEL FLOW AT LOW REYNOLDS NUMBERS. (Odpor podélne obtékané desky pri malých Reynoldsových císlech). Zbynek Janour. November 1951. 40p. diagrs., tab. (NACA TM 1316. Trans. from Letecký Vyzkumný Ústav, Praha, Rept. 2, 1947).

The present paper gives the results of measurements of the resistance of a plate placed parallel to the flow in the range of Reynolds numbers from 10 to 2300; in this range the resistance deviates from the formula of Blasius. The lower limit of validity of the Blasius formula is determined and also the increase

in resistance at the edges parallel to the flow in the case of a plate of finite width.

NACA TM 1319

TORSION AND BENDING OF PRISMATIC RODS OF HOLLOW RECTANGULAR SECTION. (Kruchenie i Izgib Prismaticheskikh Sterzhnei s Polym Pryamougol'nym Secheniem). B. L. Abramyan. November 1951. 24p. diagrs., 2 tabs. (NACA TM 1319. Trans. from Prikladnaya Mathematika i Mekhanika, v.14, no.3, 1950, p.265-276).

The torsion and bending of hollow rectangular beams was investigated without the requirement that the wall thickness be small compared with the transverse dimensions. The limits of applicability of the usual Bredt formula are indicated for the case of a square hollow tube in torsion. Formulas are given for bending stresses at different parts of the cross section of a hollow rectangular beam.

NACA TM 1321

RELATIONS BETWEEN THE MODULUS OF ELASTICITY OF BINARY ALLOYS AND THEIR STRUCTURE. (Beziehungen zwischen dem Elastizitatsmodul von Zweistofflegierungen und ihrem Aufbau). Werner Köster and Walter Rauscher. November 1951. 49p. diagrs. (NACA TM 1321. Trans. from Zeitschrift für Metallkunde, v.39, 1948, p.111-120. Dissertation Technische Hochschule Stuttgart, 1942).

A comprehensive survey of the elastic modulus of binary alloys as a function of the concentration is presented. Alloys that form continuous solid solutions, limited solid solutions, eutectic alloys, and alloys with intermetallic phases are investigated. Systems having the most important structures have been examined to obtain criteria for the relation between lattice structure, type of binding, and elastic behavior.

NACA TM 1326

CONCERNING THE FLOW ABOUT RING-SHAPED COWLINGS. PART II - ANNULAR BODIES OF INFINITE LENGTH WITH CIRCULATION FOR SMOOTH ENTRANCE. (Über die Strömung an ringförmigen Verkleidungen. II. Mitteilung: Ringkörper unendlicher Tiefe mit Zirkulation bei stossfreiem Eintritt). Dietrich Küchemann and Johanna Weber. November 1951. 41p. diagrs. (NACA TM 1326. Trans. from Zentrale für wissenschaftliches Berichtswesen über Luftfahrtforschung, Berlin. FB 1236/2, November 11, 1940).

The investigations carried out in a previous report (NACA TM 1325) concerning the flow about ring-shaped cowlings were extended by taking a circulation about the cowling into consideration. The present second report treats bodies of infinite length with approximately smooth entrance. The circulation was caused by distributing vortex rings of constant density over a stream surface extending to infinity. Furthermore, the influence of a hub body on such cowlings was dealt with. The examples treated are meant to give to the designer a basis for his design.

BRITISH REPORTS

N-11151*

Aeroplane and Armament Experimental Establishment (Gt. Brit.) VARSITY T. MK.1 VX.835 (2 x HERCULES 265). MEASURED LANDINGS. August 14, 1951. 6p. curves, tab. (AAEE Rept. A.A.E.E./873, pt.15)

Using a glide approach with full flap at 85 knots I.A.S., the landing distances were 365 yards from 50 feet to touchdown, and a further 600 yards from touchdown to stop, the values being corrected to an aircraft weight of 36,000 pounds to I.C.A.N. sea-level conditions, on a level tarmac runway. It was considered, however, that the use of full braking during these landing runs was to some extent prejudiced by the harshness of the brake control combined with the need to minimize the occurrence of tire slip (or wheel locking).

N-11236*

Royal Aircraft Establishment (Gt. Brit.) THE THEORETICAL WAVE DRAG OF SOME BODIES OF REVOLUTION. L. E. Fraenkel. May 1951. 41p. diagrs., tab. (RAE Aero 2420)

The results of linearized theory for the wave drag of bodies of revolution are applied to bodies whose profiles (meridian sections) are either straight or parabolic arcs. Forebody and afterbody drag are examined; a reversibility theorem is established; and the interference effect of the forebody on the afterbody is investigated. Two different types of approximation are considered and their results are compared.

N-11238*

Royal Aircraft Establishment (Gt. Brit.) GUST ALLEVIATION FACTOR. J. Zbrozek. May 1951. 45p. diagrs. (RAE Aero 2421)

Presents theoretical calculations of gust alleviation factor made for rigid aircraft and with one degree of freedom only (that is, vertical motion). It is shown that for average gust lengths and for orthodox (tailed) aircraft the influence of the second degree of freedom (that is, pitching) on the value of the gust alleviation factor is negligibly small, providing the pitching moment of inertia is not unduly small. The influence of aspect ratio, the importance of the mass parameter, and the gust shape on the values of the gust alleviation factor are shown. The large influence of the gust shape on the value of the alleviation factor makes the gust analysis by simple measurements of maximum aircraft acceleration inadequate, and the full records of the time history of the aircraft are necessary. An alternative, more direct method of gust measurements is suggested.

N-11396*

Royal Aircraft Establishment (Gt. Brit.)
FATIGUE TESTS ON SPECIMENS FROM DTD.364 'Z' SECTION EXTRUSIONS. M. S. Binning and J. T. Ballett. May 1951. 21p. photos., diagrs., 3 tabs. (RAE Tech. Note Met.138)

Fatigue tests were made of extruded "Z" section stringers in fluctuating tension in order to ascertain the effect of surface finishes and stress raisers. The material was made to the specification DTD.364.

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